Excerpted from LALP-06-012
Originally published April 2006

Materials Science and Technology Division

personal *profile*

# Lin Shao

## Postdoctoral fellow aims for results

MST-CINT director's funded postdoctoral fellow Lin Shao, shown in the Ion Beam Materials Laboratory, recently won a Postdoctoral Distinguished Performance Award for his work on new methods of controlling and fabricating ultra-thin semiconductor layers.

Like a dose of powerful medicine, Lin Shao aims to remedy difficult scientific problems.

"I want to be the painkiller, the person who devotes himself to solving those problems that present technical barriers," said Shao, a director's funded postdoctoral fellow in the Materials Science and Technology Division's Center for Integrated Nanotechnologies (MST-CINT).

Shao, part of the Center's nanomechanics thrust, analyzes and synthesizes nanostructured materials by ion beam processing. His goal is to hone the ion beam slicing process in silicon, a procedure essential to producing multiple-layer electronic devices. Such devices are the future of electronics due to their lower power consumption, faster switching speeds, and ability to work under extreme environments.

Shao's drive for results earned him a 2005 Postdoctoral Distinguished Performance Award for his work on new methods of controlling and fabricating ultra-thin semiconductor layers.

Shao was the candidate of choice when Mike Nastasi, then a member of MST-8, needed a skilled researcher in ion beam cutting for a Basic Energy Sciences project on ion enhanced synthesized of materials. With 45 published papers and five invited talks under his belt, Shao came to Los Alamos in February 2004 after earning his bachelor's degree from Beijing University and his doctorate in physics from the University of Houston.

"Lin just had outstanding credentials," said Nastasi, Shao's postdoctoral supervisor and now CINT nanomechanics thrust leader. Then, "it turned out all his credentials were not just fluff but he was as good as he was cracked up to be," he said, citing Shao's record of producing another 19 journal papers and three patents since arriving here— all of which attests to Shao's ability to fully make the most of Los Alamos' collaborative atmosphere.

Los Alamos "is the perfect place for research," Shao said, offering the "best facilities and a strong reputation" in his field, which makes it the ideal environment for postdoctoral career development. "I benefit a lot from brainstorming discussions with my colleagues," he said. "I admire their enthusiasm in science and their skill and knowledge in the field. With them, life is easier and full of fun."

In turn, Shao has been able to teach his fellow researchers a thing or two about ion beam analysis.

MST-8's Ion Beam Materials Laboratory (IBML) team leader Yongqiang Wang has worked closely with Shao on many ion-beam-based research projects and described him as "one of the best young ion beam researchers" he has "seen for years."

"He constantly forms hypothesis and designs new experiments to test his thinking. He carefully reads other people's papers and forms his own conclusions and hypothesis, sometime beyond that of the original authors," Wang said. The focused, innovative young scientist "is a friendly, easy-going person and an excellent team player. He often lends his ion beam expertise to help other IBML users by either producing

ion beams for them, helping with their ion beam data analysis, or carrying out the entire ion beam experiments for them when asked."

According to Nastasi, Shao's creative thinking in how to perform experiments "advanced our fundamental understanding of ion beam analysis and developed new techniques which lent themselves to ion beam practices."

Yet Shao is not content to rest on his experimental skills alone. He likes to spend his Fridays in the research center catching up on the latest research. "I don't want to be isolated," he said, adding that "it's important for scientists to keep themselves curious about everything."

He also enjoys writing and is committed to publishing his work. "Each data in a paper is your baby," he said. "I think it's my duty to take care of them very well."

He also strives to maintain a balance in his research interests.

While ion beam implantation is his mission at the Laboratory, ion beam analysis is his "personal fight," a field he first became intriqued with as an undergraduate studying the textbook of ion beam analysis pioneer Dr. Wei-Kan Chu, "which is like the Bible for engineers in China." Shao eventually earned his doctorate degree under the University of Houston professor.

Since his graduate studies Shao has maintained an interest in studying the basic physics of ion solid interactions and developing new ion beam techniques for more precise characterization of materials. "Although the technique of ion beam processing has been highly developed during the past decades, researchers face new challenges as material processing approaches the nanometer scales," he said. "I hope within the next ten years, I can become a top authority in these areas."

*— By Karen E. Kippen, MST Communications*

**A qualified operator of the Ion Beam Materials Laboratory's ion implanter and tandem accelerator, Lin Shao, photographed examining the chamber of the IBML's Rutherford Backscattering Detector, often uses his experience to assist his fellow researchers.**